The West Nile Weekly

The West Nile Weekly provides up-to-date information about West Nile virus (WNV) in South Dakota. We use records of human cases, information about current mosquito abundance and infection, and recent weather to estimate the risk of human infection across the state.

Predictions will begin with a general statewide assessment for 2016. As we move into the WNV season, we will update statewide predictions, and make more detailed analyses at local levels. This will be distributed online at http://mosquito.sdstate.edu/; to receive these updates by email, please contact justin.k.davis@sdstate.edu.

About West Nile Virus

In South Dakota, West Nile virus is transmitted primarily by infected *Culex tarsalis* mosquitoes seeking blood-meals to complete their life cycles. These mosquitoes are active from the end of May through September, but are most numerous July through August. An in-depth discussion of the region's mosquitoes can be found here.

The virus usually circulates among birds and mosquitoes, but occasionally spills over to cause human disease. South Dakota is one of the hotspots for human cases. During a major WNV outbreak in 2003, SD reported 1,040 cases to the CDC, or 18% of all cases in the US that year.

WNV looked as though it would vanish in 2011 – there were only 2 cases reported in SD – but the state reported 203 cases in the following year. Last year was relatively low with 42 cases. A more complete discussion of WNV in SD can be found here.

How's the weather?

The weather has a large influence on the risk of WNV because the mosquito vectors and bird hosts respond to changes in temperature and moisture. Our predictions rely on conditions in the upcoming

This document was prepared by the South Dakota Mosquito Information Systems project at South Dakota State University, Brookings, SD. Our research team includes an ecologist, a vector biologist, a statistician, a graduate research assistant, and several research technicians.

Human case data are provided by the SD Department of Health. Weather data are provided by the North American Land Data Assimilation System (NLDAS) of NASA. Mosquito abundance and infection data are provided by cities and local governments around the state, and without these data the modeling effort would not be possible.

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summer, which the National Weather Service predicts will likely be slightly warmer than usual (see here).

Additionally, we use historical conditions to make predictions, and early 2016 was warmer than usual. Temperatures in late February and early March repeatedly broke record highs set in the previous decade (Figure 1).

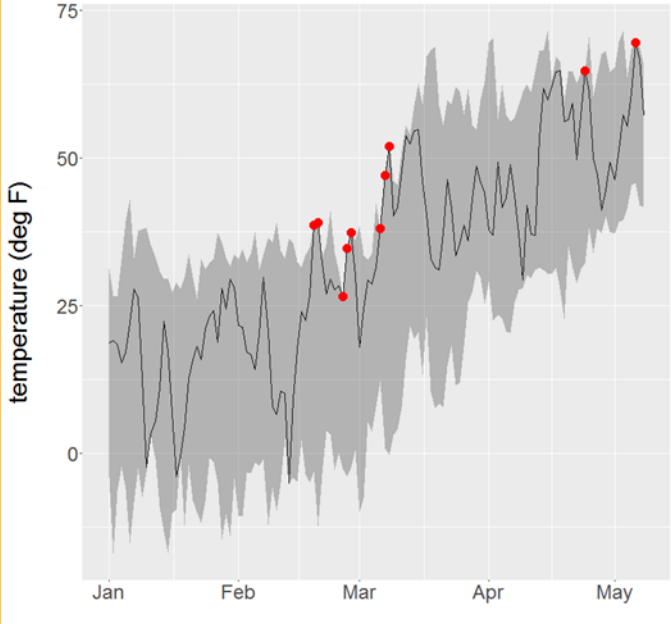

Figure 1: Mean daily temperatures in SD (line) with minimum/maximum over 2004-2016 (band). Circles indicate a new record high was set in 2016.

What to expect for the upcoming season?

The vector we see most often in the summer (*Culex tarsalis*) will begin to appear in trap collections around the end of May. The winter mosquito *Culex inornata* will appear less frequently. Positive mosquito pools will probably not appear until late June. California, however, has already reported 21 infected birds and 7 positive mosquito pools (see here), but few human cases are expected anywhere in the U.S. before early June.

To discuss this summer's predictions, we define statewide human risk in a week as the proportion of counties reporting at least one human case in that week; this gives a rough idea of how widespread transmission is at that point in time. For example, a week in August 2012 had the highest risk on record, as nearly 40% of counties reported cases in that week. Risk last year never rose above 9%.

In the figure below (Figure 2), we see that 2016 is thus far estimated to be a moderate year, with around 10% of counties reporting cases in early August, rising to approximately 15% in the height of the season.

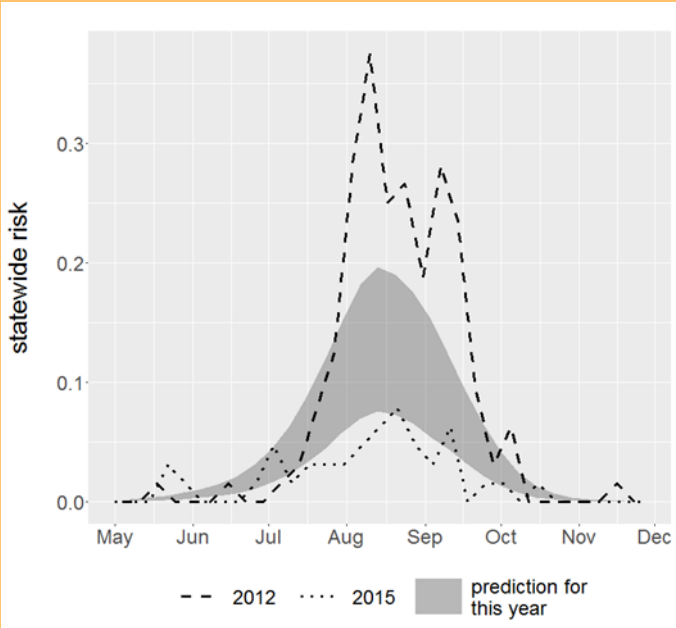

Figure 2: Estimated statewide risk in 2016 (band), with observations from 2012 and 2015 (lines).

These early predictions are based solely on weather conditions and will be revised as updated meteorological and mosquito data become available.

SUMMARY: We tend to see more human WNV in warmer years, especially when winters are warmer. Temperatures in the 2015-2016 winter were above average and new record highs were set in early 2016.

We suspect there will be fewer human cases in 2016 than there were in 2012, one of the worst years on record, but 2016 will likely have a more active WNV season than 2015.